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**MAR 29 1994**

**FEDERAL COMMUNICATIONS COMMISSION  
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March 29, 1994

William F. Caton  
Acting Secretary  
Federal Communications Commission  
Mail Stop 1170  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

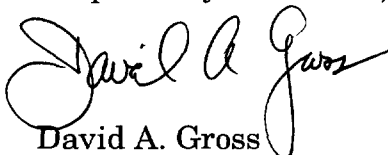
Dear Mr. Caton:

Re: ***PR Docket No. 93-61; RM-8013***

On behalf of PacTel Teletrac, please find enclosed an original and nine copies of its "***Reply Comments***" in the above-referenced proceeding.

Please stamp and return the provided copy to confirm your receipt. Please contact me or Kathleen Abernathy should you have any questions or require additional information concerning this matter.

Respectfully submitted,



David A. Gross  
Washington Counsel

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 90	)	PR Docket No. 93-61
of the Commission's Rules	)	RM-8013
to Adopt Regulations	)	
for Automatic Vehicle	)	
Monitoring Systems	)	

## REPLY COMMENTS OF PACTEL TELETRAC

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March 29, 1994

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## **SUMMARY**

Teletrac's modified proposal for sharing between wideband LMS systems is intended to promote the development of valuable tracking services, while at the same time addressing the concerns of other users in the band. Teletrac's balanced approach is equitable, reasonable, and pro-competitive.

Part 15 users have speculated that they will be unable to operate in the same spectrum as wideband LMS systems, but there is no evidence to support this claim. Teletrac operates in six major cities, without experiencing interference from the millions of Part 15 devices today, except in isolated instances. In those cases, interference can be alleviated by minor adjustments to the Part 15 devices such as lowering power levels, using directional antennas, or shifting frequencies.

Wideband and narrowband LMS systems cannot coexist. Teletrac's compromise approach, which makes 16 MHz of contiguous spectrum available to narrowband systems (up from 10 MHz) meets the IVHS needs articulated throughout the record in this proceeding. Existing systems which do not cause interference to wideband systems should be grandfathered.

Teletrac's sharing scheme is specifically designed to accommodate innovation and diversity among competing wideband LMS systems. Elimination of the proposed wideband forward link, or sharing between more than two systems in the return link, will reduce wideband system flexibility, increase infrastructure costs, and decrease service quality. Teletrac's licensing scheme discourages spectrum warehousing. Voice services would be limited to emergency applications.

It is critical that the Commission end the continuing uncertainty in this band which limits the development of valuable and beneficial new location services designed to protect property and personal safety. Teletrac urges prompt adoption of permanent rules in the 902-928 MHz band consistent with its January, 1994 compromise proposal.

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REPLY COMMENTS OF PACTEL TELETRAC

I. Introduction

PacTel Teletrac ("Teletrac"), soon to be operating under the name AirTouch Teletrac<sup>1</sup>, believes that the Commission should promptly issue final rules adopting Teletrac's January 26, 1994 proposal regarding use of spectrum at 902-928 MHz.

While a number of the comments filed on March 15 indicate qualified support for various aspects of Teletrac's new proposal as set forth in its January 26, 1994 ex parte filing,<sup>2</sup> many misunderstood its intent, its design and its effect. In these Reply Comments, Teletrac will address concerns with its proposal raised by others. Teletrac will

<sup>1</sup> On April 1, 1994, PacTel Corporation will spin off from its parent, Pacific Telesis Group, as AirTouch Communications. Each of the PacTel wireless subsidiaries will begin using the AirTouch name at that time.

<sup>2</sup> See Pinpoint Comments at 3; Hughes Comments at 5; MFS/TI Comments at 2; Uniplex Comments at 1. Unless otherwise specified, the use of the term "Comments" refers to comments filed in response to the Commission's February 9, 1994 Notice in this docket.

also make clear why our balanced approach to use of this spectrum would serve the broad public interest in preserving a multiplicity of uses in this spectrum. This specifically includes uses such as Teletrac services, which respond to the strong public interest in preservation of life and property in situations of medical emergency or criminal wrongdoing.

Briefly summarized, Teletrac's proposal is that wideband LMS systems share return link spectrum between 904-910.5 MHz, with the first two systems to construct and operate receiving co-channel protection. Sharing rules are limited and would apply only to the coordination of high powered housekeeping transmissions. High powered forward link transmissions are segregated, and placed at 924.89-925.39 MHz if narrowband, and 902.5-904 or 910.5-912 MHz if wideband.

Teletrac's modified proposal provides significantly less spectrum to wideband LMS systems on a primary basis (below government and ISM users) than the 2-8-6-8-2 MHz segmentation proposed in the NPRM in this docket. The beneficiaries of this modification are the narrowband vehicle identification systems and the Part 15 community. Both groups have complained that their interests were not being adequately protected relative to the NPRM's proposed allocations for wideband LMS systems. Those same parties now argue that even 10 MHz (down from 16 MHz) out of 26 MHz

for primary use by wideband systems is too much.<sup>3</sup> Others go further, arguing that because the Commission encouraged development of low power Part 15 devices and vehicle identification systems in this band, wideband systems should go elsewhere.<sup>4</sup> These comments make no effort to offer a balanced approach to resolution of the issues raised in this docket. They effectively disregard the public benefits of LMS systems; Teletrac, on the other hand, has offered an approach which recognizes the multiplicity of interests in this spectrum.

Accordingly, in issuing final rules in this docket, the Commission should continue to follow the basic policy concept offered in the NPRM: "Considering the multitude of benefits offered by AVM systems, it is imperative that our rules provide a competitive and dependable environment in which AVM systems can continue to develop."<sup>5</sup> These benefits include enhanced law enforcement capabilities, increased police officer safety, efficient dispatch of medical emergency services, reduced car thefts and losses, and increased public safety and security.<sup>6</sup> Teletrac's modified proposal is intended to promote the development of such

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<sup>3</sup> Mark IV Comments at 7; MFS/TI Comments at 8; Bay State Gas Comments at 2.

<sup>4</sup> See, e.g., AT&T Comments at 3; Part 15 Coalition Comments at 3; Consumer Electronics Comments at 5.

<sup>5</sup> NPRM at Para. 5.

<sup>6</sup> See Teletrac Petition for Rulemaking at 8-15, and appended letters from Los Angeles County Office of Education, City of Evanston, and the County of Los Angeles Office of the Sheriff, among others.



valuable tracking applications for which this spectrum has been allocated for 20 years, while at the same time addressing the concerns of other users of the band who also provide products and services to the public.<sup>7</sup> We believe our approach is equitable, reasonable, and pro-competitive.

## **II. Part 15 Concerns**

Part 15 manufacturers and users in the 902-928 MHz band continue to seek a reversal of the fundamental relationship between licensed and unlicensed services which the Commission has set in place: unlicensed Part 15 devices must not interfere with licensed services. The same Commission order, quoted by many parties as encouraging the development of Part 15 devices, made clear that such development must always be subject to the "basic precept of the Part 15 rules that non-licensed operations are not to cause harmful interference to established services."<sup>8</sup>

The choice is not between the Commission either moving LMS systems to another band or deciding it "does not care about Part 15 consumers."<sup>9</sup> Nor is the issue one of deciding which industry, Part 15 or wideband LMS, is of importance to

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<sup>7</sup> Teletrac designation of spectrum from 902.5-912 MHz for wideband LMS system retains the Commission's original allocation from 904-912 MHz for wideband operations. Teletrac's current system has tens of thousands of units in use, with tens of thousands more in production for its currently available services. No justification has been put forth for stranding these consumers by shifting wideband LMS systems to any other portion of the 902-928 MHz band.

<sup>8</sup> In the Matter of Amendment of Parts 2 and 15 of the Rules with regard to the operation of spread spectrum systems, 5 FCC Rcd 4123 (1990) at Para. 8.

<sup>9</sup> See e.g., ADEMCO Comments at 12.

our economy.<sup>10</sup> The issue is how to accommodate multiple providers and users of various valuable services in this spectrum.

As Teletrac has stated repeatedly, its wideband LMS system has not suffered deleterious effects due to interference from Part 15 devices except in isolated cases.<sup>11</sup> LMS systems employ spread spectrum techniques which are tolerant of Part 15 interference. The processing gain used by LMS systems (on the order of 15 DB or more) in the return link (mobile-to-base-station link) protects mobile transmissions from signals of limited power such as those from Part 15 devices. However, the near-far effects associated with radio link sharing can at times overcome the benefits of even high processing gain. Therefore, Teletrac and other wideband LMS systems employ techniques such as receiver site redundancy and retry protocols to further enhance their tolerance to interference.

Numerous parties referenced NTIA's recent estimate that more than two million Part 15 devices already occupy the 902-928 MHz frequency band today.<sup>12</sup> Teletrac systems currently serve approximately 15% of the continental U.S.

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<sup>10</sup> See Metricom Comments at 16.

<sup>11</sup> Teletrac NPRM Reply Comments at 42-46. ADEMCO argues that because Teletrac claims interference from Part 15 will be isolated, Part 15 should be elevated to co-primary status with licensed services. ADEMCO Comments at 13. While the number of problems will be small, there is no basis for completely invalidating the Commission's Part 15 policies which require Part 15 devices to prevent interference to licensed services.

<sup>12</sup> See, e.g., Metricom Comments at 8; ADEMCO Comments at 10.

population, which would imply that over 300,000 Part 15 devices are currently operating in harmony with Teletrac today.<sup>13</sup> Yet, there have been fewer than 60 instances nationwide in which there have been any signs of a problem, indicating that in well over 99% of the time, interference is not occurring. Where there is a problem, in many instances it can be alleviated by minor adjustments to the Part 15 device which do not affect its operation.<sup>14</sup> Additionally, Teletrac proposed in its March 15, 1994 filing a definition of harmful interference that would protect Part 15 users from spurious complaints.<sup>15</sup>

Because of its extensive real world experience in coexisting with Part 15 devices, Teletrac does not believe vaguely described "tests" to measure interference between

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<sup>13</sup>This is a conservative assumption given that Part 15 devices are heavily used in metropolitan areas such as those where Teletrac is operating.

<sup>14</sup>See Mobilevison Comments at Annex 2, pg. 42, recommending that installation manuals for Part 15 devices include section on power levels and correct use of directional antennas. Additionally, simple changes to shift the frequency are also possible and in many cases the Part 15 devices are designed to operate on one of several frequencies.

<sup>15</sup>Teletrac's proposed definition was as follows: "A Part 15 device will be considered a source of harmful interference if the signal level from that device exceeds the average interference and noise floor at an LMS receiver by more than 10 dB for more than 20% of the time over any 60 second period (10% if the signal exceeds the 10 dB limit at more than one LMS receiver)." Teletrac Comments at 10.

LMS and Part 15 devices would be fruitful.<sup>16</sup> "Testing" would in fact be an open-ended means of prolonging this rulemaking indefinitely, with an unlimited number of devices and scenarios to be tested.<sup>17</sup> Resources from both industries would be better spent working cooperatively on solutions for those limited cases where interference occurs -- and that cooperation can take place in the context of the rule Teletrac proposes. Given the clear public interest in LMS systems, Part 15 users cannot object to rules needed to clarify how LMS can proceed simply on the basis of speculation that interference will occur.<sup>18</sup>

Several Part 15 parties argue that they will be worse off under Teletrac's new proposal.<sup>19</sup> Clearly, this is not

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<sup>16</sup>See TIA Comments at 7. Through letters and telephone calls with Dr. Padgett from TIA, Teletrac expressed its view that its system will be able to operate with noise levels equal to or above those where Part 15 devices will start to adversely interfere with each other. Teletrac proposed an interference simulation process based on statistical models, and has provided the information needed on the performance of its receivers, power levels, signaling schemes and locations of its sites. The models for RF propagation in urban and suburban environments are well known and documented in the literature. The remaining inputs (i.e., characteristics, quantities, and usage of Part 15 devices) are available from the Part 15 community themselves.

<sup>17</sup>Although interference is measurable at the single receiver level, this measurement is not a direct indication of system performance degradation, given other design aspects such as link margin, number of sites, location of sites, and retry protocols.

<sup>18</sup>ADEMCO cites Dr. Padgett in concluding that "Part 15 devices in 902-928 MHz band pose a serious interference threat to wideband pulse-ranging AVM system's such as Teletrac's." ADEMCO Comments at 7. In fact, in his "Analysis of Teletrac Receiver Performance and Part 15 Interference", October 21, 1993, at 14, Dr. Padgett says that his conclusions imply that there may be interference problems. Teletrac's real world operations in six major cities show everyday that its LMS system has been properly designed for its environment.

<sup>19</sup>ADEMCO Comments at 10; Metricom Comments at 13.

the case. Part 15 would continue to operate in the entire band as they do today, while wideband LMS systems would be concentrated in the spectrum below 912 MHz where they would receive co-channel protection.<sup>20</sup> In contrast, under today's interim rules, an unlimited number of licensed systems can come into the entire band. Teletrac has now proposed permanent rules that no more than two wideband systems receive co-channel protection, which will bring more predictably to the band by driving wideband LMS operators to the lower 10 MHz of the band.

### III. Narrowband Local Area System Issues

Some providers of narrowband systems, such as those used for electronic toll collection, claim that the record with respect to wideband systems is incomplete and inadequate, while advocating immediate adoption of permanent rules for local area systems.<sup>21</sup> AT&T argues that wideband systems fail to meet the statutory tests for allocation of spectrum, including promoting the safety of life and

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<sup>20</sup> See Teletrac NPRM Comments at 11, footnote 13 for a more complete discussion of Part 15 issues.

<sup>21</sup> AT&T Comments at 3; Interagency Group Comments at 2. The record is far from incomplete on the issue of the inability of narrowband and wideband systems to coexist. (See Teletrac NPRM Comments at 20-27; Teletrac NPRM Reply Comments at 10-13; MobileVision Comments Annex 5). Based upon the original set of filings on Teletrac's Rulemaking Petition, the Commission concluded that narrowband LMS systems not be licensed on same bands as wideband LMS systems because "co-channel noise in the vicinity of a wide-band pulse ranging system does make it difficult, if not impossible, for the system to operate effectively." NPRM at Para. 15. No evidence has been submitted to counter this finding. Similarly, the record is complete on the societal value of adopting permanent rules for licensing wideband LMS systems (See Teletrac Petition for Rulemaking at 15-19; Teletrac NPRM Reply Comments at 5-10; Mobilevision Comments, Annex 1).

property, improving spectrum efficiency, fostering competition, providing services to the largest number of users, and increasing interservice sharing.<sup>22</sup> The record established in this docket clearly supports the opposite conclusion: wideband LMS systems meet each of the statutory requirements set forth in Section 332 of the Communications Act of 1934, as amended.<sup>23</sup> Particularly in the areas of safety and personal security, Teletrac's system is designed expressly for the purpose of protecting property and preventing danger to human lives.<sup>24</sup>

Despite the fact that Teletrac now proposes that narrowband systems be allocated 16 MHz of contiguous spectrum on a co-primary basis, relative to 10 MHz for wideband systems, these parties claim that such a scheme still prohibits "cost-effective, performance based choices" between AVM systems.<sup>25</sup> Teletrac believes that its proposal is in fact extremely generous to narrowband local area systems, and meets the IVHS needs articulated throughout the

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<sup>22</sup>AT&T Comments at 2.

<sup>23</sup>See Teletrac Petition for Rulemaking at 7, noting that each Teletrac system can serve up to sixteen million radio location units and handle up to six million location requests per day in a specific geographic area. Teletrac's new proposal provides for increased spectrum efficiency, sharing and competition within the band. Teletrac Comments at 2-4. See also Mobilevision Comments at Annex 1.

<sup>24</sup>See evidence set forth in Teletrac Petition for Rulemaking at 10 (discussion of "panic button" feature); 11 (discussion of stolen vehicle services); 13 (discussion of law enforcement applications such as narcotics investigations; and 14 (discussion of missing children applications). See also Teletrac NPRM Reply Comments Appendices A to J.

<sup>25</sup>See, e.g., Interagency Group Comments at 4.

record in this proceeding.<sup>26</sup> Additionally, as we have stated in the past, narrowband systems should not be required to relocate out of 902-912 MHz spectrum unless there is actual interference.<sup>27</sup>

#### **IV. Wideband LMS System Issues**

##### **A. Wideband Forward Links**

Teletrac's scheme allows two providers to use either a wideband return link of up to 8 MHz (in conjunction with narrowband forward links) or, at the cost of a portion of its return link spectrum (up to 1.5 MHz), a wideband forward link.<sup>28</sup> Several parties criticized Teletrac's proposal to permit each system in a market exclusive use of 1.5 MHz for a forward link as unnecessary, or designed to accommodate only its unique capabilities, thus excluding other technologies and systems from the market.<sup>29</sup> Others argued that Teletrac's design artificially limited wideband LMS providers to two.<sup>30</sup> As described below, Teletrac's design

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<sup>26</sup>Mark IV, AT&T, and Hughes each report that they are designed to use 6 MHz of continuous bandwidth. Mark IV Comments at 2. Teletrac objects to AmTech's proposal allowing local area systems to utilize three 6 MHz local-area channels as an inefficient use of 18 MHz of spectrum for such limited range transmissions. Specifically, 913 MHz should not be utilized if the side-band emissions cause interference to wideband system operations below 912 MHz. AmTech Comments at 11.)

<sup>27</sup> Teletrac Comments at 14.

<sup>28</sup>This allocation from 902.5-912 MHz combined with the narrowband forward link allocation at 924.89-925.39 comprise the entire allocation of primary wideband LMS system use. Teletrac continues to support retaining narrowband forward link transmission at this frequency in order to protect the tens of thousands of units currently in operation.

<sup>29</sup>Mobilevision Comments at 20; SBMS Comments at 18.

<sup>30</sup>AMTECH Comments at 7; Pinpoint Comments at 17.

provides maximum diversity and innovation with no anticompetitive effect.

Teletrac has maintained consistently that wideband LMS systems require 8 MHz to provide a viable commercial system, with adequate location capacity and accuracy, in the 902-928 MHz frequency band.<sup>31</sup> Teletrac continues to hold this position.<sup>32</sup> Teletrac's sharing proposal was therefore designed to meet this requirement, while (1) minimizing the overall spectrum needed by wideband LMS operations; (2) allowing for technical innovation; and (3) supporting a diverse set of providers including those who use either forward or return link transmissions for radiolocation. Teletrac believes its proposal best accomplishes these objectives in a way that is feasible, practical, and flexible.

As set forth in Teletrac's earlier filings, wideband LMS systems cannot share spectrum in which wideband forward link transmissions of one provider coexist with the return link transmissions of another provider.<sup>33</sup> Thus, a sharing proposal must separately allocate forward link spectrum. The commentors in this proceeding have proposed a variety of wideband LMS system technologies. For example, Pinpoint's

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<sup>31</sup>Teletrac Petition for Rulemaking at 20. See also Mobilevision Comments at 25; Pinpoint Comments at 22, challenging SBMS's conclusions regarding the adequacy of 4 MHz per operator.

<sup>32</sup>Teletrac Comments at 2.

<sup>33</sup>Teletrac NPRM Comments, Appendix 2 at 10-14.



system uses the entire band for both forward and return links.<sup>34</sup> Others, including Teletrac, use narrowband forward links and wideband return links.<sup>35</sup> A third approach proposes to use forward link transmissions to perform the location function.<sup>36</sup> A wideband forward link and narrowband return link would also allow for location determination at the mobile such as occurs in GPS, though no system is known to do this today.

It is precisely this variety in approaches which the Teletrac proposal is designed to accommodate. Unless a wideband forward link is segregated at the outset, wideband LMS licensees will be precluded from ever offering radiolocation capabilities using forward link transmissions, thus locking LMS systems into current technology and designs. While facilitating such technical innovation, Teletrac's scheme also permits current providers the flexibility to utilize the 1.5 MHz as they choose, thus maximizing diversity among competing systems.

Teletrac's design allocates the minimum bandwidth needed to assure adequate location accuracy for the shared subsegment while allocating the remainder for wideband forward link or additional contiguous reverse link spectrum. Although no currently operating LMS systems are known to

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<sup>34</sup>Pinpoint Comments, Exhibit B at 3.

<sup>35</sup>Teletrac Petition for Rulemaking at 21; Mobilevision NPRM Comments at 18.

<sup>36</sup>Uniplex Application dated October 21, 1993, Exhibit A.

perform radiolocation functions using their forward link (most likely due to the significantly increased mobile unit complexity and costs that would be needed compared to existing LMS and GPS mobiles), 1.5 MHz should be adequate spectrum for accurate forward link location determination if and when the technology advances sufficiently to make it practical.<sup>37</sup>

#### **B. Sharing Issues**

Teletrac's sharing scheme was also criticized as contradictory to past analyses, due in part to a misperception that Teletrac is advocating a time-sharing approach. As Teletrac has argued in the past, time-sharing between wideband LMS systems is not practical. Such a scheme will result in inefficiencies (where one operator needs more capacity and another's system is empty); incentives to create new firms (who enter the market to receive "their share" of spectrum); and extensive oversight and enforcement burdens.<sup>38</sup>

On the other hand, minimal sharing rules are needed to permit some predictability in system operation and development, while not limiting innovation, diversity, and flexibility among wideband competitors. Pinpoint argues

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<sup>37</sup>Compared to return link location determination schemes, less spectrum is needed in the forward link, given that longer integration times and higher received signal strengths (for a given distance) are possible. When compared to the 1 megachip per second signals received by commercial GPS receivers, this is a reasonable expectation and supports the 1.5 MHz allocation.

<sup>38</sup>Teletrac NPRM Comments, Appendix 1 ("Pickholtz Analysis") at 30-34. See also Mobilevision Comments at Annex 3.

that Teletrac's timesharing proposal is too limited and should be left to the licensees in a market to negotiate, under general time-sharing, open entry principals.<sup>39</sup> By limiting the strict sharing rules to housekeeping functions,<sup>40</sup> Teletrac's proposal requires the minimum oversight necessary.

It must be noted that although sharing of the return link is feasible between LMS systems, there is a limit to which such sharing remains practical and economically viable. As stated above, LMS systems must employ other measures beyond processing gain such as site redundancy and retry protocols in order to overcome the near-far effects associated with a shared environment. The degree of site redundancy and number of retries required to maintain acceptable qualities of service (e.g., accuracy and reliability) in the presence of multiple signals come at the expense of infrastructure cost and system capacity. Both of these increase exponentially with the amount of sharing in the channel. Interference from one system causes retries on

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<sup>39</sup>Pinpoint Comments at 14. Among other problems, Pinpoint's plan would inhibit the ability of customers to use their services outside of their home markets. Competitors in one market may adopt a completely different sharing scheme than competitors in an adjacent market. Thus some minimal overarching principles are required, beyond which companies are free to utilize a variety of air interface technologies.

<sup>40</sup>SBMS argues that Teletrac's proposal is inconsistent because the 50 ms calibration period for each system constitutes 5%, not 1%, of the air time available to the two systems. SBMS Comments, Exhibit B at 3. While the 50 ms slot of every other second would be the only time in which a system could conduct housekeeping functions, an operator would be required to keep such transmissions to less than 1% under Teletrac's proposal. Nor is the housekeeping period "wasted" if not utilized, as mobile transmissions are still permitted at any time.

the other system(s), these retries cause more interference to the other system(s), which in turn cause more retries, etc. Each additional signal has the potential for causing more retries and thus more interference (its own plus that from resulting retries.) This is well known in contention-based channel access schemes which become progressively more inefficient as the channel loading increases. Therefore, the number of systems sharing the channel must be limited to allow any of the providers to maintain commercially viable operating conditions (i.e., affordable infrastructure costs, sufficient capacity, and acceptable qualities of service).

### C. System Diversity

SBMS claims that Teletrac's proposed scheme is unworkable unless two nearly identical LMS technologies are deployed over nearly identical network topologies.<sup>41</sup> To the contrary, differences in signal structure, coding, center frequencies and bandwidth are likely to aid sharing and result in less interference.<sup>42</sup>

Spectrum reuse (sharing) schemes employing orthogonal spreading codes at the same chip rate and center frequency

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<sup>41</sup>SBMS Comments, Exhibit B at 1.

<sup>42</sup>The primary purpose of LMS systems is to determine mobile unit location, and in all of the known systems, this is accomplished through precise time of arrival estimation of transmitted signals. The correlation process used by LMS system receivers to extract this time of arrival information from a mobile's signal also serves to cause all other signals (interference) to appear as additive noise to the receiver. In fact the correlation between signals is a measure of how similar they are to each other. Any well designed system in a shared environment (as the ISM band is) strives to minimize the correlation between the desired signal and all other signals.

(as in cellular CDMA) achieve limited performance in separating signals in applications such as the return link of LMS systems. In order to achieve their full performance potential, such schemes require synchronization between signals which is not possible in the return link of LMS systems. Signals from two mobiles cannot be synchronized in this case due to differences in frequency and chip rate caused by hardware component tolerances, relative movement between mobile units, the need to simultaneously receive signals at several receive sites and the uncertainties in signal timing caused by variations in propagation.

In the absence of synchronization, signals having different chip rate, spreading code type, spreading code length, and center frequency may be separated as effectively as, if not better than, signals for which these parameters are the same. Hence, the reverse link of LMS systems may be shared even if the systems employ significantly different LMS technologies. Furthermore, the topologies of the network are irrelevant. The positions of the receiver sites of two different LMS systems have no bearing whatsoever on their ability to share the same spectrum.<sup>43</sup>

Finally, Pinpoint objects to Teletrac's sharing scheme because it could not accommodate the higher power needed by

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<sup>43</sup>However, if the forward link is shared it would be important to coordinate network topologies or transmitter activity since the fixed transmit sites would cause near-far effects that do not change over time, resulting in permanent dead zones in each system's coverage if not properly coordinated.

Pinpoint.<sup>44</sup> Based upon Pinpoint's filings, however, it could operate above 912 MHz subject to different sharing rules given its stated ability to tolerate interference from narrowband LMS systems.<sup>45</sup>

## V. Licensing Issues

SBMS criticizes Teletrac's "first to construct and operate" proposal as anticompetitive, stating that Teletrac's existing authorizations would be immediately transformed into monopoly BTA licenses.<sup>46</sup> First, any wideband LMS operator may receive authorization in any BTA, just as they may under the interim rules. Under Teletrac's plan, however, such authorized systems would receive no co-channel protection unless they actually build a system covering 50% of the population within a service area, and have real paying customers. Under this approach, there is no "warehousing" of spectrum, because there is no protection unless a system is built.

Second, SBMS's conclusion is premised upon its belief that two systems cannot share, but the problems they identify in the Virginia Tech report do not fully take into account the characteristics of LMS system return links.<sup>47</sup>

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<sup>44</sup>Pinpoint Comments at 32.

<sup>45</sup>See, e.g. Pinpoint Comments, Appendix B.

<sup>46</sup>SBMS Comments at 15. See also Part 15 Coalition Comments asserting that expanding the license area to BTAs would amount to a windfall for those licensees who have yet to build-out in certain markets. Part 15 Coalition Comments at 4.

<sup>47</sup>Teletrac Comments, footnote 13. See also discussion on the ability of nonidentical wideband LMS systems to share return link spectrum above.

Furthermore, in addition to the second operator who will share the band on a protected basis, additional providers will be licensed on a noninterfering basis to maximize competition in the provision of these services to the extent technically feasible.<sup>48</sup>

Pinpoint expresses concerns about the procedural and conceptual difficulties of the "first to construct and operate" proposal, but Teletrac believes that implementation questions, such as what constitutes a "paying unit", are much easier to answer than guessing in advance whether promising technologies will be economically and technically feasible.<sup>49</sup> Teletrac's approach allows the Commission to avoid evaluating whether systems which sound good on paper are commercially viable.

#### **VI. Emergency Voice**

A number of parties object to any use of 902-928 MHz spectrum for voice communications, citing fears that such use will grow to dominate the band, and noting that numerous other bands have been allocated for voice services.<sup>50</sup> These fears are misplaced. Unlike the cellular, PCS and SMR spectrum cited as appropriate for voice communications services, wideband LMS systems would not be interconnected

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<sup>48</sup>See also Teletrac Petition for Rulemaking at 5, regarding multiple competitors in other bands offering location services over wide areas.

<sup>49</sup>Pinpoint Comments at 31. Nor does Teletrac believe that it is realistic to assume that more than two systems will obtain their 1500th customer on exactly the same day.

<sup>50</sup>SAIC Comments at 2; AmTech Comments at 7; Bay State Gas Comments at 8.

to the PSTN for voice traffic. Furthermore, Teletrac's system is designed as a location service, and any overuse of voice communications would quickly overwhelm the system.<sup>51</sup> The very limited purpose of the emergency voice authorization -- to permit users to let public health and safety agencies know what kind of help is needed -- is clearly in the public interest. Any concerns others have about misuse of this authority can be easily dealt with through the Commission's normal fine and forfeiture processes.

Mobilevision, on the other hand, argues for full authority to provide location related voice and data services in order to meet the needs of its customers and compete with PCS and other service providers.<sup>52</sup> Teletrac rejects Mobilevision's view that its emergency voice proposal is designed to prevent Mobilevision from competing for national accounts. All wideband LMS systems would be subject to the same limitations, consistent with the Commission's stated intention that transmissions in this band be limited to location functions and associated status and instructional messages.<sup>53</sup>

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<sup>51</sup>Teletrac has proposed limits on the power and duration of emergency voice transmission for that purpose.

<sup>52</sup>Mobilevision Comments at 15.

<sup>53</sup>NPRM at footnote 17.



## **VII. Conclusion**

Teletrac believes that its January 26, 1994 proposal offers the most balanced and equitable approach to the multiplicity of interests in this spectrum. Teletrac's proposal accommodates diversity and innovation among wideband LMS systems, and rewards only licensees who actually construct and operate systems. It provides increased contiguous spectrum for narrowband systems, which cannot coexist with wideband LMS systems. Finally, Teletrac's peaceful coexistence with Part 15 users in this spectrum will continue, based upon the robust design of LMS systems. Teletrac urges the Commission to adopt promptly permanent rules for the LMS band consistent with Teletrac's compromise proposal.

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